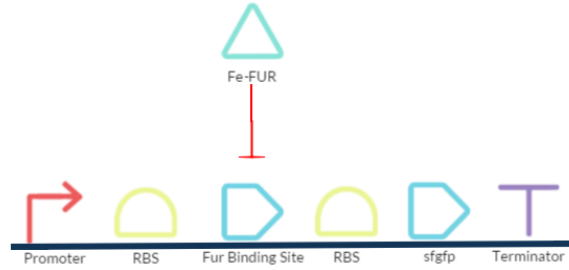


Biosenser_Fe-FUR



Formulae for two certain parts

Fe

$$\frac{d[\text{Fe}]}{dt} = p \cdot \text{Ferext} - K_{\text{FeFUR}}[\text{FUR}][\text{Fe}] + \text{dff}[\text{FeFUR}]$$

FUR

$$\frac{d[\text{FUR}]}{dt} = \text{Fur0} - K_{\text{FeFUR}}[\text{FUR}][\text{Fe}] + \text{dff}[\text{FeFUR}]$$

FeFUR

$$\frac{d[\text{FeFUR}]}{dt} = K_{\text{FeFUR}}[\text{FUR}][\text{Fe}] - \text{dff}[\text{FeFUR}] - \frac{1}{N_A \cdot V} \frac{d[\text{Furbindingsite}]}{dt}$$

Furbindingsite

$$\frac{d[\text{Furbindingsite}]}{dt} = \frac{K_{il}}{K_f} [\text{Furbindingsite}] \left(1 - \frac{[\text{FeFUR}]}{N_{pla1}} \right)$$

LacI and lacI

$$\frac{d[\text{LacI}]}{dt} = \chi_{\text{Promoter}_1} k_p [\text{lacI}^F] - D_{\text{LacI}} [\text{LacI}]$$

Set $k_p = 0.5$

$$[\text{lacI}^F] = [\text{lacI}] \frac{k_{il}}{k_f} [\text{Furbindingsite}] \left(1 - \frac{[\text{lacI}][\text{Furbindingsite}]}{N_{pla1}} \right)$$

RFP and rfp

$$\frac{d[\text{RFP}]}{dt} = \chi_{\text{Plac}_1} k_p [\text{rfp}^F] - \text{dff}[\text{RFP}]$$

Set $k_p = 0.5$

$$[rfp^F] = [rfp] \frac{k_{il}}{k_f} [Furbindingsite] \left(1 - \frac{[lacI][Furbindingsite]}{N_{plal}} \right)$$

Parameter Table

Symbols	Parameters	Values and Units
p	Permeability of cell wall	0.1 min ⁻¹
K_{FeFUR}	Formation constant of FeFur complex	0.01 M ⁻¹ *s ⁻¹
Fur0	Fur production rate	0.01 mM*min ⁻¹
dff	FeFUR degradation rate	0.001 min ⁻¹
D_LacI	LacI degradation rate	0.0015 min ⁻¹
N_{A}	Avogadro's constant	6.02*10 ²⁰ mol ⁻¹
V	Volume of a bacterium	6.5*10 ⁻¹⁶ m ³
k_{il}	Sensor efficiency	6.3*10 ⁻⁵
k_f	Fixation rate of FeFUR	10 ⁻⁴ min ⁻¹
N_plal	unset	250
k_p	Translation rate	0.5

Reference: <http://2013.igem.org/Team:Evry>